



Farmers' Strategies for Breeding Subtropical Sheep in the UAE

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A B S T R A C T

The knowledge of community-based breeding of sheep was linking to farmers breeding practices with animal derived food security in the United Arab Emirates. A stratified survey was conducted in person with 291 farmers from all regions of Abu Dhabi. The results revealed a substantially unequal distribution of sheep breeds, with the Najdi breed accounting for the biggest share (39.7%) and followed by the Awassi breed (26.4%). The remaining breeds were Habsi (1.5%), Hari (1.5%), Jaziri (1.7%), Orb (9.6%), Sudani (2.2%), Somali (3.2%), Pakistani (1.2%), Indian (1.5%), Chios (2.2%), their crossbreds (8.1%), and less common breeds (1.2%). Most breeds were found in the Al-Ain region (58.8%), while less was observed in Abu Dhabi (19.9%) and Al-Dhafra (21.3%). Both male and female farmers employed breeding practices based on scientific theories such as pure-breeding or crossbreeding and selection. Furthermore, farmers who are breeding just sheep flocks were more interested in breeding pure breeds, whereas farmers who are breeding mixed flocks of sheep and goats were more interested in crossbreeding. Additionally, potential efforts are required to resolve the wide and long use of rams as well as the inbreeding prevention plan. Other modifications included keeping aged ewes in the flock and female farmers' lack of breeding skills. They advocate for a community-based breeding program to be implemented by small-scale farmers to optimize productivity gains for better contribution in food security. For medium and large-scale production, an intensive breeding program is also advised in the Al-Ain region considering profitability and income generating. It is advisable to integrate farmers' production traits and existing breeding practices into future sustainability strategies to better contribute to global food security.

Keywords: animal-based food security, community-based breeding, selection, small ruminant

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INTRODUCTION

Sheep breeds have roles that go beyond sustaining farmers' livelihoods to take part in ventures managed by large investors and smallholder farmers. Sheep, in compared to large farm animals, have a short reproductive cycle, eat low-quality feed, and are well adapted to a wide range of environments (1-3). They

produce milk, meat, skin, and fibre, which provide a variety of income prospects for community and industrial enterprises (4,5). Sheep are the most prevalent and common livestock in the United Arab Emirate (UAE), accounting for more than 46% of total farm animal heads (6). Nonetheless, the sheep population is made up of several breeds and hybrids (7,8) in nearby countries. However, according to a previous assessment, sheep

production in the UAE is unsustainable and inefficient due to the excessive use of all production inputs (9). There could be a variety of reasons for this, including farmers who do not view it as a source of money but rather as a means of supplying meat and milk for domestic consumption.

The important matter is to describe the sheep' production systems that prevail in the UAE, which include breeding objectives and breeding practices applied by farmers, if any. Such a description based on scientific knowledge would provide stakeholders and decision makers with effective and sustainable breeding strategies and a genetic resource utilization and conservation plan (10-14). Furthermore, designing a convincing genetic improvement program for the farmers of Abu-Dhabi Emirate necessitates gathering information about genetic variation, the traditional and common breeding practices (8,15,16). To our knowledge, no earlier studies are available describing the sheep production system, considering breeding practices in the country or the nearing Gulf countries. Sheep breeding has so far lacked knowledge of a community-based breeding program. Therefore, the main goal of the current study was to describe the sheep production systems regarding breeding practices performed by farmers. Thus, the information about replacement source, mating systems, selection practices, breed preferences, and length of productive life for ewes and rams are expected outcomes that would be useful for the genetic improvement of productivity by providing the decision makers with this practical information. In addition, highlight whether pure breeding and crossbreeding practices are widespread.

MATERIALS AND METHODS

Selection of the Survey Area

The Abu-Dhabi Emirate is found between 22°40" and 25°N and 51° and 56°E and considered a very hot desert area with low rainfall, and its skies are clear year-round. The average maximum annual temperature goes beyond 39°C, in addition to high humidity during summer period, while cooler temperatures (19°C) are during the period from November to March. Thus, during 9 months of wide range of cool to hot temperature, a survey was completed during the period from December 2015 and September 2016 covering all municipalities (regions), Abu-Dhabi, Al-Ain and Al-Dhafra.

Sampling and Interview Procedures

For each 1% of sheep population in a sub-region from all Abu-Dhabi regions, 5 breeders were randomly selected and interviewed, with at least of 3 breeders. Therefore, a total of 291 sheep breeders were selected using a stratified random sampling procedure (7). These, breeders own a total of 406 flocks of different sheep and goat breeds, totaling 80401 heads which represent around 5% of the total population heads (6).

A pretested questionnaire was arranged to gather information associated with sheep breeding practices in the Emirate of Abu-Dhabi and Ethical Research Committee

(Approval NO. AFAC-2017), depending upon recommended guidelines of the Food and Agriculture Organization (FAO) (17). A permission was provided for farmers' interview from the ethical committee of the Abu Dhabi Food Control Authority after reviewing the questionnaire. Sheep breeders were requested to reveal information about their flock size and structures, breeds owned, and uses of their small ruminants (17). They were also asked general information about the socioeconomic status of the owner and their farm such as gender of owner and location of the farm. Breeds that were only present in few farms (1 or 2) were grouped together and named "Others". Rules in Abu-Dhabi Emirate, prevent farmers to graze small ruminants, including sheep outside their properties, which are of three types: random farms (the most available), registered farms, and mixed farms of plants and animals (7). Two types of flocks were found: pure sheep or mixed with goats. Flock size was considered small if number of adults is from 30 - 150 heads; medium if the number is 151 - 350 heads; and large if exceeding 350 heads.

Statistical Analysis

Effects of potential factors such as region, farmers' gender, property type, flock type, and size, with their interaction effects were investigated by preliminary stepwise ANOVA analysis using the GLM procedure (18) was applied to study their influence on the continuous variables. However, interactions were removed from the final model if probability level exceed ($P = 0.25$). Mean comparison was made for significant factors at $P < 0.05$ using the t-test. Qualitative data were statistically analyzed by the Chi-square (χ^2) test using the FREQ procedure (SAS, 2012) with same factors were applied to the χ^2 test.

RESULTS

Sheep breeds in the UAE are scattered throughout three major regions, with Al-Ain hosting most of them in the most prevalent farm type, random farms (Table 1). According to the findings, sheep breeds present in the UAE include more than 12 types, including crossbreds. They are known by the following names: Najdi, Awassi, Orb, Somali, Chios, Jazira, Hari, Indian, Habsi, Pakistani, crossbreds, and other less common breeds such as American, Afghani, South African, Omani, and Muflon. The majority (39.7%) sheep breed was the Najdi followed by the Awassi breed (26.4%).

In fact, sheep breed was distributed unequally ($P < 0.0001$) and significantly related to farm region ($P < 0.0001$) and farm type ($P < 0.012$). Najdi, Awassi, Orb, Sudani, Hari, and crossbreds, for example, were more common in Al-Ain than in Abu-Dabi and Al-Dhafra. The most common breeds in the UAE were Awassi, Najdi, Orb, Crossbreds, Somali, Sudani, and Hari. It was discovered that the Habsi breed was not found in the Al-Ain region. However, no Indian, Pakistani, or other breeds were found in the Al-Dhafra region. Mixed farms contained a high number of Chios sheep and a low proportion of Jaziri and Habsi sheep. The remaining breeds were discovered in a small proportion (<2.2%), making them unusual breeds, and they were reared on registered farms. Overall,

stakeholders and sheep producers should consider that breeds are found more frequently in the Al-Ain region and

on random farms than other breeds when making future sustainable conservation decisions.

Table 1. Distribution of sheep breeds according to farm region, and premises type

Variable	N	Najdi	Awassi	Orb	Crossbred	Somali	Chios	Sudani	Jaziri	Hari	Indian	Habsi	Pakistani	Other	Overall%
N	406	161	107	39	33	13	9	9	7	6	6	6	5	5	
Breed %		39.7	26.4	9.6	8.1	3.2	2.2	2.2	1.7	1.5	1.5	1.5	1.2	1.2	
Region <i>P</i> -value															<.0001
Abu-Dhabi	116	25.5	25.2	15.4	36.4	23.1	55.6	11.1	57.1	33.3	66.7	83.3	60.0	60.0	28.6
Al-Ain	222	68.3	50.5	48.7	51.5	23.1	33.3	77.8	0.0	50.0	33.3	0.0	40.0	40.0	54.7
Al-Dhafra	68	6.2	24.3	35.9	12.1	53.9	11.1	11.1	42.9	16.7	0.0	16.7	0.0	0.0	16.8
Premises type <i>P</i> -value															0.0116
Mixed farming	108	27.3	31.8	18.0	21.2	7.7	44.4	22.2	42.9	16.7	0.0	33.3	0.0	60.0	26.6
Random farms	204	55.3	46.7	51.3	57.6	61.5	22.2	55.6	42.9	50.0	0.0	33.3	40.0	20.0	50.3
Registered farms	94	17.4	21.5	30.8	21.2	30.8	33.3	22.2	14.3	33.3	100.0	33.3	60.0	20.0	23.2

Other: African, Haw, Hawarez, Jabali, Maltese, Saanen, Zafari, Saedi, Rahbi and Somali

The sheep breeds were kept by their owners, who replaced them with purebreds from their own flock of both ewes (95.9%) and rams (85.3%) (Table 2). Small proportion (7.5%) of all farms replaced rams from both the same farm and other farms in the UAE, while 4.5% replaced rams just from other farms' flocks. Only 1.6 and 1.5 percent of farmers, respectively, considered imported ewes and rams as replacements. This study reported on various sources of imported replacement males and females. They had been Kuwait, Morocco, Oman and Saudi Arabia.

Table 2. Source of replacement male and female sheep and goat used by the farmers in Abu-Dhabi Emirate

Source	Ewes %	Rams %
Same flock	95.9	85.3
Other flocks in UAE	1.60	4.50
Imported	1.60	1.50
Both same flock and other flocks in UAE	1.00	7.50
Both same flock and imported	0.00	1.10

The current study is looking into whether farmers use scientific theory to apply breeding practices such as purebreeding, crossbreeding mating methods and female and male selection methods. The findings revealed that sheep farmers who raised pure sheep flocks were very interested

in pure breeds (Table 3). Farmers who had both sheep and goats in their flocks, on the other hand, practiced crossbreeding substantially ($P < 0.0001$) more than those who raised only sheep (41.80% vs 16.40%). The studies also revealed no differences in breed purity practices among farmers based on location, premises type, or flock size. Crossbreeding was considerably ($P = 0.001$) used by farmers as a mating type in different regions, with Al-Ain farmers using it the most (43.8%).

In addition, crossbreeding was significantly ($P < 0.046$) practiced more in large flock sizes farms than that in medium and small flock sizes and registered farms and other types of farms (Table 3). Male and female selections were practiced more in Al-Dhafra than Al-Ain than that in Abu-Dhabi. However, mixed farm owners were significantly ($P = 0.0001$) more interested in male selection than those of the owners of registered and random farms. Furthermore, crossbreeding was significantly more common in big flock size farms than in medium and small flock size farms ($P < 0.004$), and registered farms than in other types of farms. Male and female selections were more common in Al-Dhafra and Al-Ain than in Abu-Dhabi. Owners of mixed farms, on the other hand, were significantly (85.10%) more engaged in male selection than owners of registered and random farms.

Table 3. Applying some management techniques by farmers of Abu-Dhabi Emirate in their farms

Variable	Mating Type		Selection	
	Pure breeding	Crossbreeding	Female selection	Male selection
Overall	71.30	35.60	41.3	74.60
Region <i>P</i> -value	0.077	0.001	<.0001	<.0001
Abu-Dhabi	66.70	30.30	19.0	42.90
Al-Ain	69.40	43.80	47.5	83.60
Al-Dhafra	83.10	17.00	63.4	90.90
Premises type <i>P</i> -value	0.188	0.145	0.003	<.0001
Mixed farming	75.00	38.70	52.7	85.10
Random farms	64.80	27.80	35.6	58.20
Registered farms	72.30	41.30	26.1	72.70
Flock size <i>P</i> -value	0.901	0.046	0.012	0.004
Small	70.20	27.80	32.9	65.30
Medium	72.70	35.00	38.2	73.40
Large	70.50	45.70	55.6	86.90
Flock type <i>P</i> -value	0.004	0.001	0.034	0.081
Pure sheep	87.90	16.40	37.5	75.00
Mixed with goat	68.90	41.80	45.4	76.70

Flock size: small =< 150, medium 151 - 350 and large > 350 heads

Table 4 shows the overall ranking of sheep breeds according to farmers' preferences. Najdi was the most preferred breed, followed by Awassi, Jaziri, Sudani, Hari, and Somali, whereas the Indian breed showed the lowest preference rank. The differences in ranking among sheep breeds were significant overall ($P < 0.0001$).

When breed preference was evaluated according to owner and farm characteristics, significant differences

were observed within the Abu Dhabi region, registered farms, medium-sized flocks, and mixed flocks, whereas no significant differences were detected within the other subgroups of region, premises type, flock size, and flock type. These rankings also varied among subgroups. For example, within registered farms, Jaziri and Hari breeds showed the highest first-rank preference, followed by Awassi and Najdi breeds (**Table 5**).

Table 4. Overall farmers' preference ranking of sheep breeds

Breed	N	Average rank	R1 (%)	R2 (%)	R3 (%)
Najdi	161	1.29 ± 0.06	77.0	17.4	5.0
Awassi	107	1.44 ± 0.07	63.6	30.8	3.7
Orb	39	1.90 ± 0.12	46.2	28.2	15.4
Crossbred	33	2.70 ± 0.13	0.0	51.5	27.3
Somali	13	1.69 ± 0.21	61.5	15.4	15.4
Chios	9	2.33 ± 0.25	22.2	44.4	11.1
Sudani	9	1.67 ± 0.25	66.7	11.1	11.1
Jaziri	7	1.57 ± 0.29	42.9	57.1	0.0
Hari	6	1.67 ± 0.31	50.0	33.3	16.7
Indian	6	3.00 ± 0.31	16.7	16.7	16.7
Habsi	6	2.67 ± 0.31	16.7	16.7	50.0
Pakistani	5	2.40 ± 0.34	20.0	40.0	20.0
Others	5	2.60 ± 0.34	20.0	20.0	40.0
<i>P</i> -value		<0.0001			

Values are presented as percentages unless otherwise indicated. Average rank is expressed as mean ± SEM. R1, R2, and R3 indicate first, second, and third preference ranks, respectively

Table 5. Farmers' first-, second-, and third-rank preferences for sheep breeds according to selected owner and farm characteristics

Characteristic	Najdi	Awassi	Orb	Crossbred	Somali	Chios	Sudani	Jaziri	Hari	Indian	Habsi	Pakistani	Others
Male owners													
R1	76.0	64.7	43.8	0.0	60.0	22.2	57.1	50.0	50.0	20.0	25.0	20.0	20.0
R2	17.6	29.4	31.3	46.4	20.0	44.4	14.3	50.0	33.3	20.0	25.0	40.0	20.0
R3	5.6	3.5	15.6	28.6	20.0	11.1	14.3	0.0	16.7	20.0	25.0	20.0	40.0
<i>P</i> -value	0.0001												
Abu Dhabi region													
R1	23.3	14.7	1.7	0.00	0.90	0.90	0.90	0.90	1.70	0.00	0.90	0.90	0.00
R2	19.5	33.3	16.7	41.7	0.00	20.0	0.00	75.0	0.00	25.0	20.0	0.0	33.3
R3	14.6	3.70	16.7	33.3	33.3	20.0	0.00	0.00	0.00	25.0	60.0	33.3	33.3
<i>P</i> -value	0.0009												
Registered farms													
R1	57.1	65.2	33.3	0.00	50.0	0.00	50.0	100	100	16.7	0.00	33.3	0.00
R2	32.1	34.8	25.0	0.00	0.00	0.00	0.00	0.00	0.00	16.7	0.00	0.00	0.00
R3	10.7	0.00	25.0	42.9	25.0	33.3	0.00	0.00	0.00	16.7	100.0	33.3	100
<i>P</i> -value	0.0003												
Medium flocks													
R1	80.6	65.1	33.3	0.00	62.5	20.0	75.0	33.3	66.7	0.00	0.00	50.0	0.00
R2	14.9	25.6	33.3	57.1	25.0	60.0	25.0	66.7	0.00	100	0.00	0.00	50.0
R3	4.50	7.00	16.7	28.6	0.00	0.00	0.00	0.00	33.3	0.00	66.7	50.0	0.00
<i>P</i> -value	<0.0001												
Mixed flocks													
R1	71.4	57.8	46.2	0.00	54.6	22.2	50.0	33.3	40.0	16.7	0.00	20.0	33.3
R2	21.4	35.6	28.2	44.0	18.2	44.4	16.7	66.7	40.0	16.7	20.0	40.0	0.00
R3	6.40	4.40	15.4	28.0	18.2	11.1	16.7	0.00	20.0	16.7	60.0	20.0	66.7
<i>P</i> -value	<0.0001												

Values are presented as percentages. R1, R2, and R3 indicate first-, second-, and third-rank preferences, respectively. The *P*-value refers to the overall comparison of breed preference ranks within each owner or farm characteristic.

Table 6 demonstrates the effects of different factors on the length of productive life of ewes and rams and their culling rates. Keeping ewes, on the one hand, was not affected by any of the studied factors; all farmers keep their

ewes in the flock for in overall average of around 6.3 years. On the other hand, keeping rams was affected by the gender of the owner and the region of the flock. In general, flock owners keep ewes longer than rams. Female flock owners

were keeping rams for around 11 months more than male owners. Flock owners in the Al-Dhafrah region keep their rams longer than that in Al-Ain and Abu-Dhabi regions. The culling rate of ewes is very low (4.60%) and was different among regions of the Emirate while the rams' culling rate is acceptable (34.78%) and was not affected by any studied factors.

Table 6. Productivity life length and culling rates of ewes and rams by farmers in Abu-Dhabi Emirate

Variable	Keeping ewes (year)	Keeping rams (year)	Ewes culling (%)	Ram culling (%)
Gender	0.4563	0.0052	0.1249	0.8313
P-value				
Male	6.26±0.19	5.73±0.18	2.53±0.71	36.74±8.21
Female	6.50±0.32	6.62±0.32	4.34±1.18	33.82±14.06
Region	0.4942	0.0069	<.0001	0.3276
P-value				
Abu-Dhabi	6.48±0.29	5.66±0.27	2.31±1.09	49.15±12.38
Al-Ain	6.17±0.25	6.03±0.24	6.74±0.92	36.19±10.28
Al-Dhafra	6.49±0.33	6.84±0.33	1.26±1.30	20.50±16.47
Flock size	0.2398	0.2692	0.5256	0.0521
P-value				
Small	6.11±0.28	5.91±0.27	4.04±1.04	55.60±12.08
Medium	6.35±0.26	6.20±0.25	3.61±0.96	26.71±11.21
Large	6.68±0.29	6.43±0.28	2.66±1.10	23.52±13.02

Flock size: small =< 150, medium 151 – 350 and large > 350 heads

Reasons behind farmers' culling decisions for ewes in this study were reported (Table 7). In fact, some farmers of different regions, premises types and flock sizes were not practicing culling at all. For example, more than half of the

owners did not practice culling in the Abu-Dhabi region and registered farms. Nevertheless, farmers of different flock sizes were slightly differing in performing no culling. Most important reasons for ewes culling were old age, diseases and home consumption. Common reasons for practicing ewes culling were old age (46.1%) then diseases (39.8%). Both reasons were significant ($P < 0.0001$) and differently practiced by farmers of different regions where Al-Ain farmers considered them mostly. Disease ($P < 0.0001$) and weakness ($P < 0.05$) were also significant for culling ewes by farmers of different premises types in which mixed farming farmers practiced very well (53.6%). However, registered farmers were not practicing culling ewes (58.1%).

It is worth mentioning that ewes were culled by farmers of the Al-Dhafra region because of the consumption its meat in the household (22.4%). Culling ewes because of old age, rams were mainly culled for this reason (60.3%) with no significant effect due to all studied factors. The second reason was also diseases (33.9%); however, significant ($P < 0.0001$) differences were found due to region and premises type. Low fertility and productivity and home consumption were significantly different due to different regions of the Emirate. Farmers of Al-Dhafra were practicing ram culling more than farmers in different regions. Specifically, more than a third of Abu-Dhabi farmers were not practicing rams' culling. Except for diseases as a reason for culling rams, similar practices were performed by farmers of different premises types. The low fertility of rams was significantly ($P < 0.01$) higher in pure sheep flocks in comparison with mixed flocks with goats.

Table 6. Culling reasons for ewes and rams

Variable	N	Ewes culling reasons								Rams culling reasons							
		Genetic	Old age	Low fertility	Low productivity	Diseases	No culling	Home consumption	Weakness	Genetic	Old age	Low fertility	Low productivity	Diseases	No culling	Home consumption	Weakness
Overall	284	2.1	46.1	12.7	15.5	39.8	26.1	8.8	7.0	5.8	60.3	20.5	10.3	33.9	8.0	10.7	2.2
Region P-value		0.719	<.0001	0.619	0.301	<.0001	<.0001	<.0001	0.134	0.993	0.068	0.043	<.0001	<.0001	<.0001	0.0019	0.209
Abu-Dhabi	66	1.5	33.3	10.6	10.6	12.1	62.1	1.5	1.5	5.6	50.0	5.6	2.8	2.8	36.1	5.6	0.0
Al-Ain	160	1.9	57.5	14.4	15.6	55.6	10.0	6.9	8.8	5.8	58.3	22.3	6.5	49.6	2.9	7.2	3.6
Al-Dhafra	58	3.5	29.3	10.3	20.7	27.6	29.3	22.4	8.6	6.1	73.5	26.5	26.5	12.2	2.0	24.5	0.0
Premises type P-value		0.521	0.069	0.689	0.135	<.0001	<.0001	0.127	0.014	0.071	0.916	0.385	0.185	<.0001	0.0017	0.406	0.191
Mixed farming	155	1.3	50.3	14.2	19.4	53.6	9.7	11.6	11.0	2.9	61.0	23.5	11.8	44.1	2.9	12.5	3.7
Random animal farm	86	3.5	46.5	10.5	11.6	22.1	39.5	7.0	3.5	9.7	58.1	16.1	11.3	12.9	14.5	9.7	0.0
Registered animal farm	43	2.3	30.2	11.6	9.3	25.6	58.1	2.3	0.0	11.5	61.5	15.4	0.0	30.8	19.2	3.9	0.0
Flock Size P-value		0.104	0.025	0.121	0.378	0.585	0.0443	0.118	0.304	0.426	0.384	0.645	0.308	0.674	0.189	0.365	0.287
Small	82	0.0	39.0	8.5	12.2	39.0	35.4	3.7	8.5	7.8	53.1	18.8	6.3	34.4	12.5	6.3	4.7
Medium	116	1.7	42.2	11.2	14.7	37.1	25.0	12.1	8.6	3.3	63.3	18.9	10.0	36.7	4.4	13.3	1.1
Large	86	4.7	58.1	18.6	19.8	44.2	18.6	9.3	3.5	7.1	62.9	24.3	14.3	30.0	8.6	11.4	1.4
Flock Type P-value		0.210	0.824	0.47	0.419	0.746	0.333	0.274	0.598	0.192	0.71	0.002	0.549	0.744	0.242	0.481	0.337
Pure sheep	58	0.0	44.8	15.5	12.1	37.9	31.0	5.2	8.6	2.0	58.0	36.0	8.0	32.0	12.0	8.0	4.0
Mixed flocks	226	2.7	46.5	12.0	16.4	40.3	24.8	9.7	6.6	6.9	60.9	16.1	10.9	34.5	6.9	11.5	1.7

Flock size: small =< 150, medium 151 – 350 and large > 350 heads

DISCUSSION

The state of the art for optimized and sustainable breeding program priority is a sound knowledge of the right breeding practices. In this study, we provided information on the breeding practices of sheep farmers of the Abu-Dhabi Emirate in UAE. The first important result was reporting more than 12 sheep breeds existing in the soil of UAE. In general, most of those breeds originated in nearby and faraway countries. Najdi -the most common breed, Awassi or Neimi, Orb, Hari and Habsi are assigned to the Arabian Gulph States (18,20). Jaziri breed is assigned to Iran across the Gulf. The rest of the breeds are assigned to faraway countries, such as the Somali breed from Somalia, the Chios breed from Cyprus, the Indian breed from India and the Pakistani from Pakistan. Other breeds (rare breeds) were exotic breeds such as American, Afghani, South African, Omani and Muflon. It is good to mention that crossbred individuals which are found sometimes as a whole flock have been reported as individuals produced by the mating of rams and ewes of different breeds. Crossbreeding was practiced by almost a third of sheep farmers extensively by farmers of Al-Ain, registered farms, large flock size and mixed flock. Those farmers might be practicing crossbreeding to utilize different genetic resources to produce crossbred progeny of a specific performance or type. However, pure breeding was the main mating type practiced by most farmers who were in favor of breeding indigenous breeds. In general, pure breeding is the mating of rams and ewes of the same breed in a single flock. Nevertheless, two-thirds of farmers were breeding Najdi and Awassi in separate flocks indicating preferences towards those breeds.

The noted practice, in regards, showed farmers of UAE were good practitioners of ewes and rams' selection and culling. First, they were -across all the factors- keeping and culling ewes and rams for many reasons. Rams were kept for longer periods by female farmers (women) and the farmers of Al-Dhafra than Al-Ain regions and Abu-Dhabi region. The reasons for keeping rams and ewes longer in the flock might be due to farmers' social regulations considering them as property or assets or lacking knowledge of good breeding practices. Second, keeping ram by farmers in the regions might include good selection practices as they considered elite rams with good breeding value. Moreover, this practice might cause existing more than one ram within a flock and thus increase the possibility to avoid inbreeding. Keeping breeding rams for prolonged periods was reported in earlier studies (21). Consequently, further decisions on breeding practices are needed for better utilization of breeding rams originating within the same flock and for avoiding inbreeding (22). Many sheep farmers use their rams as breeding rams for successive generations. The best breeding practiced by most sheep farmers in the world are practicing community-based breeding program which allows breeding ewes to mate with rams from other flocks to minimize the inbreeding risk (22). Therefore, efforts should be made towards applying

selection and identification of breeding the elite rams before keeping and culling decisions are taken.

The studied factors were affecting farmers' decisions on ram and ewes' selection. Recently, Tabbaa et al (23) reported that UAE sheep farmers considered growth rate, twinning ability, fertility, and body morphology as the most important for selection ewes and growth rate and body morphology as the most important for selection rams. Furthermore, culling practices should be given better attention and should be considered in decision-making because few farmers ever practiced it for ewes and rams. Knowledge of justified reasons for culling was attained with the highest rank for old age and diseases. Similar results were reported (22). More reasons for culling were reported for rams such as home consumption or cash income which is the major contribution of sheep to pastoralists' livelihood (1,24). In the end, the effects of sheep flock size and region on breeding practices were well noted. The result obtained in this study agrees with previous reports on sheep flock size, regions, and different production systems where farmers of large sheep flocks applied better breeding practices in comparison with the farmers of small or medium flock sizes and/or premises type (21,25-27). For example, the farmer of a large flock was aware of the significant contribution of sheep into his/her business as valuable food source of animal products and income. It is worth mentioning that current study indicated high chance of success breeding program strategy when scientific breeding practices considered (28).

Plans of avoiding inbreeding are needed to minimize mating of related rams and ewes. It is advisable to provide well known sustainable solutions such as a community-based breeding program for small scale farmers. In addition, for medium and large-scale farmers, it is recommended to implement an intensive-based breeding program in the Al-Ain region. For any future sustainable breeding decision, it is advisable to account farmers' production characteristics and breeding practices in both programs. In conclusion, all stakeholders in breeding programs and the sheep production industry should consider that sheep farmers of the Al-Ain region and those of random farms for future sustainable breeding decision and programs. It is recommended that establishing a genetic database, training programs and piloting a community-based breeding scheme.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization, supervision, validation, formal analysis, investigation, methodology, Validation, and writing, review and editing: MJT. Conceptualization, data curation, investigation, methodology, supervision, writing

original draft and editing: RMA. Conceptualization, data curation, funding acquisition, investigation, project administration, supervision, validation, visualization, writing: FSB. Formal analysis, investigation, methodology, Validation, and writing, review and editing: MMB. All authors have read and approved the final version of the manuscript.

ARTIFICIAL INTELLIGENT DECLARATION

The authors declare that they are responsible for the accuracy and integrity of all content of the manuscript, including part generated by AI, and it is not used as a co-author.

REFERENCES

- Degen A. Sheep and goat milk in pastoral societies. *Small Ruminant Res.* 2007;68(1-2):7-19. <https://doi.org/10.1016/j.smallrumres.2006.09.020>
- Tabbaa MJ, Al-Atiyat R. Breeding objectives, selection criteria and factors influencing them for goat breeds in Jordan. *Small Ruminant Res.* 2009;84(1-3):45-50. [10.1016/j.smallrumres.2009.03.007](https://doi.org/10.1016/j.smallrumres.2009.03.007)
- Bekuma A, Tadesse T. Breeding objectives, selection criteria and reproductive performance of indigenous sheep in west Wallaga zone, Oromia, Ethiopia. *J Appl Anim Res.* 2025;53(1):1-12. <https://doi.org/10.1080/09712119.2025.2467108>
- Al-Atiyat RM. Genetic diversity analyses of tropical goats from some countries of Middle East. *Genet Mol Res.* 2017;16(2):gmr16029656. <https://doi.org/10.4238/gmr16029656>
- Hao F, Peng M, Xu Z, Zhang X, Wang J, Ding R. Editorial: Genomic insights into sheep and goat breeding efficiency. *Front Vet Sci.* 2025;12:1717356. <https://doi.org/10.3389/fvets.2025.1717356>
- SCAD (Statistical Centre of Abu-Dhabi). *Statistics Book.* Abu-Dhabi Emirate, UAE. 2023. Available from: https://scad.gov.ae/related-publications?p_r_p_categoryId=208 [Accessed 15th March 2025].
- Timothy JM, John RS, James NI. Optimizing a stratified sampling design when faced with multiple objectives, *ICES Journal of Marine Science.* 2007;64(1):97-109. <https://doi.org/10.1093/icesjms/fsl013>
- Al-Atiyat RM, Salameh NM, Tabbaa MJ. Analysis of genetic diversity and differentiation of sheep populations in Jordan. *Electron J Biotechnol.* 2014;17(4):168-173. <https://doi.org/10.1016/j.ejbt.2014.06.002>
- Emsen E, Korkmaz MK, Odevci B, Alnuaimi A, Almarzooqi M, Alketbi A, Alhammedi D. Developing a Practical Welfare Assessment Tool for Intensive Sheep and Goat Farming in Hot-Arid Regions: Pilot Validation in the United Arab Emirates. *Animals.* 2026;16(4):563. <https://doi.org/10.3390/ani16040563>
- Al-Atiyat RM, Tabbaa MJ, Salameh NM, Tarawneh K, Al-Shmayla L, Al-Tamimi HJ. Analysis of genetic variation of fat tailed-sheep in Southern region of Jordan. *Asian J Anim Vet Adv.* 2012;7(5):376-389. [10.3923/ajava.2012.376.389](https://doi.org/10.3923/ajava.2012.376.389)
- Kebede T, Haile A, Dadi H. Smallholder goat breeding and flock management practices in the central rift valley of Ethiopia. *Trop Anim Health Prod.* 2012;44(5):999-1006. <https://doi.org/10.1007/s11250-011-0033-0>
- Asefa B, Kebede K, Effa K. Breeding objectives, selection criteria and breeding system of indigenous goat types in bale zone, oromia, Ethiopia. *Int J Agric Res Innov Technol.* 2015;5(2):7-15. <https://doi.org/10.3329/ijar.v5i2.26263>
- Dagnew Y, Urge M, Yadesse Y, Gizaw S. Sheep production and breeding systems in northwestern lowlands of Amhara region, Ethiopia: implication for conservation and improvement of Gumz sheep breed. *Open J Anim Sci.* 2017;7(02):179-197. <https://doi.org/10.4236/ojas.2017.72015>
- Lembeye F, Castellaro G. Developing a Breeding Objective for Dual-Purpose Merino Precoz Breed in Central Chile: Derivation of Economic Weights. *Chil J Agric Anim Sci.* 2025;41(2):209-216. <https://doi.org/10.29393/chjaas41-19defe20019>
- Mbuku SM, Kosgey IS, Kahi AK. Identification systems and selection criteria for small ruminants among pastoralist communities in northern Kenya: prospects for a breeding programme. *Trop Anim Health Prod.* 2010;42(7):1487-1492. <https://doi.org/10.1007/s11250-010-9584-4>
- Wurzinger M, Gutiérrez GA, Sölkner J, Probst L. Community-Based Livestock Breeding: Coordinated Action or Relational Process?. *Front Vet Sci.* 2021;8:613505. <https://doi.org/10.3389/fvets.2021.613505>
- FAO. Phenotypic characterization of animal genetic resources. FAO Animal Production and Health Guidelines No. 11. Rome, Italy; 2012.
- SAS Institute. Statistical analysis system. Release 9.4.1. SAS User Guide. Cary, NC, USA; 2012. p. 88-125.
- Meydan H, Rashaydeh F, Al-Atiyat R, Yıldız B. Genetic Diversity of Awassi Sheep Reared in Fertile Crescent Based on Microsatellites: A Review. *J Anim Plant Sci.* 2024;34(5):1099-1111. <https://doi.org/10.36899/JAPS.2024.5.0792>
- Al-Atiyat RM, Aljumaah RS, Alshaikh MA, Abudabos AM. Microsatellite-Based Genetic Structure and Diversity of Local Arabian Sheep Breeds. *Front Genet.* 2018;9:408. <https://doi.org/10.3389/fgene.2018.00408>
- Getachew T, Haile A, Tibbo M, Sharma AK, Sölkner J, Wurzinger M. Herd management and breeding practices of sheep owners in a mixed crop-livestock and a pastoral system of Ethiopia. *Afr J Agric Res.* 2010;5(8):685-691. <https://hdl.handle.net/10568/1858>
- Jaitner J, Sowe J, Secka-Njie E, Dempfle L. Ownership pattern and management practices of small ruminants in The Gambia: implications for a breeding programme. *Small Ruminant Res.* 2001;40(2):101-108. [https://doi.org/10.1016/S0921-4488\(00\)00219-9](https://doi.org/10.1016/S0921-4488(00)00219-9)
- Tabbaa MJ, Barakeh FS, Baker MM. Factors influencing farmers decision on breeding objectives and selection criteria for sheep breeds in Abu-Dhabi Emirate, UAE. *Bulg J Agric Sci.* 2019;25(1):141-152.
- Edea Z, Dessie T, Dadi H, Do KT, Kim KS. Genetic Diversity and Population Structure of Ethiopian Sheep Populations Revealed by High-Density SNP Markers. *Front Genet.* 2017;8:218. <https://doi.org/10.3389/fgene.2017.00218>
- Haile A, Getachew T, Mirkena T, Duguma G, Gizaw S, Wurzinger M, Soelkner J, Mwai O, Dessie T, Abebe A, Abate Z, Jembere T, Rekiq M, Lobo RNB, Mwacharo JM, Terfa ZG, Kassie GT, Mueller JP, Rischkowsky B. Community-based sheep breeding programs generated substantial genetic gains and socioeconomic benefits. *Animal.* 2020;14(7):1362-1370. <https://doi.org/10.1017/S1751731120000269>
- Gatew H, Kebede K, Bekele M, Lakew A, Negash A, Wolkaro T. Community-based breeding programs for sheep in Ethiopia: Performance evidence for scaling up. *Vet Anim Sci.* 2026;31:100580. <https://doi.org/10.1016/j.vas.2026.100580>
- Mohamed AH, Gebrekidan B, Kumar N, Gebremeskel HF, Abose MM. Phenotypic Characterization and reproductive performance of blackhead Somali sheep in Fafen zone of Somali Regional State, Ethiopia. *Adv Agric.* 2022;2022:4865941. <https://doi.org/10.1155/2022/4865941>
- Al-Atiyat RM, Tabbaa MJ, Barakeh FS. Successful strategic breeding plan for small ruminants in Middle East: Case of Awassi sheep and Shami goat of Jordan. *Emirates J Food Agric.* 2026;38:1-11. <https://doi.org/10.3897/ejfa.2026.172035>

إستراتيجيات المزارعين لتربية وتحسين الأغنام شبه الاستوائية في الإمارات العربية

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الخلاصة

ربطت معرفة برامج تحسين الأغنام المجتمعية ممارسات التربية لدى المزارعين بالأمن الغذائي للمنتجات الحيوانية في دولة الإمارات العربية المتحدة. ان الهدف الرئيسي للدراسة الحالية هو وصف ممارسات تربية وتحسين الأغنام. حيث أُجري مسحٌ طبقيٌّ ميدانيٌّ مع 291 مزارعاً من جميع مناطق أبوظبي. وكشفت النتائج عن تفاوتٍ كبيرٍ في توزيع سلالات الأغنام، حيث استحوذت سلالة النجدي على الحصة الأكبر (39.7%)، تلتها سلالة العواسي (26.4%). أما السلالات المتبقية فكانت الحبسي (1.5%)، والحري (1.5%)، والجزيري (1.7%)، والعرب (9.6%)، والسوداني (2.2%)، والصومالي (3.2%)، والباكستاني (1.2%)، والهندي (1.5%)، والكبوس (2.2%)، بالإضافة إلى سلالاتٍ مهجنةٍ منها (8.1%)، وسلالاتٍ أقل شيوعاً (1.2%)، ووجدت معظم السلالات في منطقة العين (58.8%)، بينما لوحظ وجودها بنسبةٍ أقل في أبوظبي (19.9%) والظفرة (21.3%). هذا واستخدم المزارعون، رجالاً ونساءً، ممارسات تربية قائمة على نظريات علمية كالترية النقية أو التهجين والانتخاب. كما أبدى المزارعون الذين يربون قطعان أغنام نقية اهتماماً أكبر بتربية السلالات النقية، بينما أبدى المزارعون الذين يربون قطعاناً مختلطة من الأغنام والماعز اهتماماً أكبر بالتهجين. ومع ذلك، وجدت أنشطة غير المهنية للمزارعين وتشكل عقبات يجب معالجتها عند تنفيذ برامج التربية لزيادة إنتاج الغذاء ذو المصدر الحيواني. إضافة إلى ذلك، ثمة حاجة إلى بذل جهود لحل مشكلة الاستخدام الواسع والمطول للكباش، فضلاً عن خطة منع التزاوج الداخلي. وشملت التعديلات الأخرى إبقاء النعاج المسنة في القطيع، ونقص مهارات التربية لدى المزارعات. ويدعو المزارعون إلى برنامج تربية مجتمعي يُنفذه صغار المزارعين لتحسين مكاسب الإنتاجية والمساهمة بشكل أفضل في الأمن الغذائي. أما بالنسبة للإنتاج المتوسط والكبير، فيُنصح أيضاً ببرنامج تربية صناعي في منطقة العين، مع مراعاة الربحية وتوليد الدخل. يُنصح بمراعاة خصائص إنتاج المزارعين وممارسات التربية عند اتخاذ أي قرار مستقبلي بشأن التربية المستدامة بما يُسهم في تحقيق الأمن الغذائي.

الكلمات المفاحية: الأمن الغذائي للمنتجات الحيوانية، التربية الوراثية المجتمعية، الانتخاب، المجترات الصغيرة